

Diabetes drug found in Lake Michigan could harm fish, researchers say

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There is more than one way to measure prescription drug use. The most direct method is to count prescriptions filled by pharmacies. That would show, for example, that more than 180 million prescriptions for diabetes drugs were dispensed in 2013.

Or you could test the treated water coming out of sewage-treatment plants.

That approach reveals that in Lake Michigan waters outside one plant, the diabetes drug metformin was the most common personal-care product found by researchers with the School of Freshwater Sciences at the University of Wisconsin-Milwaukee.

According to their latest research, the levels of metformin were so high that the drug could be disrupting the endocrine systems of fish.

Metformin is a first-line treatment for [type 2 diabetes](#) and is the most commonly prescribed medicine for the condition. In 2013, about 70 million [prescriptions](#) were dispensed, according to IMS Health, a drug-market research firm.

The drug can be found in water samples taken two miles off the shore of Lake Michigan.

"It was kind of a surprise," said Rebecca Klaper, a professor of freshwater science at UWM. "It was not even on our radar screen. I said,

'What is this drug?' "

The drugs get into the sewage and eventually the lake because they are not broken down completely after they are consumed and then excreted.

The metformin concentrations are low, compared with the amount taken by people.

For example, coming right out of the treatment plant the levels are about 40 parts per billion. About two miles away, they drop to 120 parts per trillion.

Other commonly found substances include caffeine, sulfamethoxazole, an antibiotic, and triclosan, an antibacterial and antifungal found in soap and other consumer products.

Klaper co-authored a 2013 journal paper on the finding, and other one in 2014.

The more recent research suggests that metformin in lake water is not just a curious artifact of everyday life.

The study looked at the effect of metformin on fathead minnows in the lab that were exposed to the [drug](#) at levels found in the lake for four weeks.

It found gene expression suggesting disruption of the endocrine system of male fish, but not females. In essence, the males were producing biochemicals that are associated with female minnows. The biochemicals are precursors to the production of eggs.

Klaper said the changes also could be affecting other species such as perch, walleye and northern pike.

The UWM research confirms what others have found regarding [prescription drugs](#) showing up in lakes, rivers and streams, said Melissa Lenczewski, an associate professor of geology and environmental geosciences at Northern Illinois University.

For years, it was assumed that the volume of water in the Great Lakes was so enormous that any drugs that got through treatment facilities would be diluted to the point that they would not pose a problem, said Lenczewski, who was not a part of the UWM study.

That theory itself now is being diluted.

More concerning are the much higher levels of antibiotics that are being put into rivers and streams near pig farms where the drugs are used to produce larger animals, she said.

In addition, strains of antibiotic-resistant bacteria also have been found in water near those farms, she said.

"It is very alarming how much we are putting drugs out there in the environment," she said.

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